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What is the best time to harvest grapes destined for withering? Ripeness and dehydration length affect phenolic composition of Nebbiolo grapes

AIM: *Sfursat di Valtellina* is a DOCG reinforced wine produced in Valtellina from partially withered red grapes of *Vitis vinifera* L. cv. Nebbiolo. The grape ripeness degree and the dehydration process strongly influence the physicochemical characteristics of grapes [1, 2, 3]. In particular, grape skin and seeds contain several classes of phenolic compounds strictly associated with red wine quality, which are significantly affected by these factors [4]. The aim of this research is to assess the combined influence of different ripeness levels and withering rates on the standard chemical composition and phenolic profile of winegrape in order to provide new insights and approaches to the management of withering, searching for the valorization of grape potentialities.

METHODS: During a two-year study (vintages 2019 and 2020) three binomials have been tested: early harvest/long withering (EL), medium-term harvest/medium-term withering (MM) and late harvest/short withering (LS). Grape samples of cv. Nebbiolo from two vineyards at different locations (Valtellina upper and lower valley) were harvested and placed into a typical '*fruttaio*' dehydration room, following the wine type designation guidelines. Grape must composition, mechanical parameters and extractable phenolic profiles (total polyphenols, total anthocyanins, total flavonoids and methylcellulose tannin assay) of grape skins and seeds were studied before and after the withering process.

RESULTS: At the end of withering, EL thesis showed the highest values of sugars and acidity, and the lowest pH. The content of total polyphenols, flavonoids, and tannins in seeds showed a decreasing trend by leaving the grapes on the plant longer, whereas their impact increased considerably after withering with respect to fresh samples, due to berry dehydration. Instead, the skin phenolic compounds were less influenced by harvest period, but their concentrations on grape weight increased after withering. Skin extractable anthocyanins experienced a distinct trend for the two vineyards studied: their concentration increased in withered samples from the upper-valley vineyard and decreased in those from the lower-valley. The grapes mechanical properties may have influenced this aspect, as previously demonstrated [5]. Finally, the differences highlighted between the three binomials studied were more noticeable in vintage 2019 rather than in 2020, probably due to the higher rainfall in the final stage of grape ripening in vintage 2020.

CONCLUSIONS: In this research, the combined effect of ripeness degree and withering process length have been studied. The results obtained shows that these two variables can be modulated according to the desired oenological objective. In general, early/medium harvest and long/medium withering gave the best results, particularly for seeds polyphenols, although the vineyard location and the weather conditions of the year influenced the withered grape phenolic characteristics.

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